METHOD AND APPARATUS FOR CONTROLLING OUTPUT BASED ON TYPE OF CONNECTOR

PRIORITY

[0001] This application claims priority under 35 U.S.C. §119(a) to Korean Patent Application filed on Jul. 20, 2015, in the Korean Intellectual Property Office and assigned Serial number 10-2015-0102640, the entire disclosure of which is incorporated herein by reference.

BACKGROUND

[0002] 1. Field of the Disclosure

[0003] The present disclosure relates generally to a method of controlling output based on a type of connector, and more particularly, to a method of controlling the output of the circuit by varying the configuration of a circuit based on a type of connector and an electronic device adapted to the method.

[0004] 2. Description of Related Art

[0005] In recent years, electronic devices such as smartphones, tablet personal computers (PCs), digital cameras, MP3 players, e-book readers, etc. have been generally used in people's daily life. Electronic devices are capable of connecting to external output devices (e.g., earphones, headset, etc.) and also supporting the output of an unbalanced-type of earphones capable of making a call by wire. Electronic devices are capable of supporting a microphone embedded in external output devices. Electronic devices are also capable of supporting external output devices without a microphone to output unbalanced audio signals. Electronic devices may include a connector fitting part (e.g., a socket, a receptacle, etc.) for receiving a connector (e.g., an earphone jack) of an external output device. Examples of the connector of external output devices are 3-, 4-, and 5-conductor versions which have 3, 4 and 5 conductors (contacts), respectively. Most external output devices have a connector of a 3- or 4-conductor version (a 3- or 4-conductor connector). A conventional 4-conductor connector includes standard contacts to support unbalanced-type earphones capable of making a call by wire. Types of earphones may be divided into an unbalanced-type and a balanced-type. Balanced-type earphones are capable of outputting a higher quality audio than unbalanced-type earphones.

[0006] Audio signals transmitted from electronic devices may be classified into a balanced-type and an unbalanced-type. Since the balanced-type and an unbalanced-type of audio signals are created with signals that differ from each other, they need individual output contacts configured in different ways. For example, the balanced-type audio signal may be created with an R signal, an L signal, and a G signal, and the unbalanced-type audio signal may be created with an L+ signal, an L− signal, an R+ signal and an R− signal. Conventional electronic devices do not support balanced-type-based audio signals. Therefore, when conventional electronic devices are connected with balanced-type earphones or headsets, they have difficulty in outputting a balanced-type audio of a high quality.

[0007] Accordingly, conventional electronic devices may need a separate connector fitting part to support a balanced-type of output devices (e.g., earphones, headsets, etc.). This results in additional costs. Alternatively, conventional electronic device may be implemented to include two 3.5 Φ connector fitting parts with distinguishing marks. However, users may mistake one of the two connector fitting parts and insert a connector into the incorrect fitting part, which causes users inconvenience. Conventional electronic device may also be implemented to include a 3.5 Φ connector fitting part and a 2.5 Φ connector fitting part. However, this asymmetric structure may cause design issues.

SUMMARY

[0008] The present disclosure has been made to address the above-mentioned problems and disadvantages, and to provide at least the advantages described below.

[0009] Accordingly, an aspect of the present disclosure is to provide an electronic device which allows a connector of an external output device (e.g., a balanced-type or an unbalanced-type) to be connected; identifies a type of the connected external output device; and varies the circuit configuration to support the type of the external output device, without requiring an additional connector fitting part for supporting a balanced-type.

[0010] Accordingly, another aspect of the present disclosure is to provide a method for an electronic device to identify a connector of an external output device connected thereto; and support both balanced-type and unbalanced-type audio outputs, based on the configuration of the identified connector.

[0011] Accordingly, another aspect of the present disclosure is to provide an electronic device which is capable of varying the circuit configuration depending on whether the connector is a 3- or 5-conductor version, without being limited to only a 4-conductor connector, and outputting a proper audio.

[0012] Accordingly, another aspect of the present disclosure is to provide an electronic device with a microphone function which is capable of supporting both balanced-type and unbalanced-type audio outputs.

[0013] Accordingly, another aspect of the present disclosure is to provide an electronic device which is capable of minimizing the degradation of audio quality and supporting both balanced-type and unbalanced-type audio outputs without lowering the performance of the audio outputs.

[0014] In accordance with an aspect of the present disclosure, an electronic device is provided. The electronic device includes a housing; an opening formed in one side of the housing; a hole communicating with the opening; a receptacle, placed inside the hole, for receiving one of first, second and third external connectors; and a circuit electrically connected to the receptacle. Each of the first and second connectors comprises a first number of contacts. The third external connector comprises a second number of contacts less than the first number of contacts. The circuit identifies which one of the first, second and third external connectors is inserted into the receptacle; provides, when the first external connector is inserted into the receptacle, an audio output signal to the first external connector in a first manner; provides, when the second external connector is inserted into the receptacle, an audio output signal to the second external connector in a second manner which differs from the first manner; and provides, when the third external connector is inserted into the receptacle, an audio output signal to the third external connector in a third manner which differs from the first and second manners.

[0015] In accordance with another aspect of the present disclosure, a method of controlling the output based on a